Pigmentation of the Heart in the Bichir, *Polypterus senegalus*

Melanophores, Heart, Polypteriformes, Neural crest

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The presence of melanin-containing cells in the heart has been documented in tetrapods, but not in fish. It has been even suggested that dark pigmented cells are exclusively associated with hearts having two atria and two ventricles. The aim here is to report the occurrence of pigment cells in the heart of the bichir, an extant representative of the polypteriformes, an ancient ray-finned fish lineage that split from the stem of the actinopterygians soon after their divergence from the sarcopterygians. The bichir heart is composed of sinus venosus, atrium, ventricle, conus arteriosus and bulbus arteriosus arranged sequentially within the pericardial cavity. Dendritic-shaped cells containing melanosomes were found in the five cardiac components of the 12 bichirs included in this study. Numerous melanophores were distributed regularly over the surface of all segments having myocardium in their walls, thus resulting in a marked pigmentation of the whole heart. The bulbus arteriosus, which in the bichir is reduced in size, showed an even more intense pigmentation. In all instances, the melanophores were localized in the subepicardial space. Pigment cells also occurred in the pericardium and ventral aorta. The functional role of melanocytes in the tetrapod heart remains obscure. Anti-inflamatory activity, cytoprotection and effects on the viscoelastic properties of the cardiac tissue have been adduced as possible actions of such cells. The role of pigment cells in the bichir heart constitutes a new open question. Interestingly, however, the only cells that have been shown to form melanin-containing cells in the heart derive from the neural crest. If the melanophores of the bichir heart are indeed of neural crest origin, it would suggest a much more extensive contribution and persistence of elements from the neural crest in the primitive heart of jawed vertebrates as assumed so far in most papers devoted to vertebrate heart embryology.

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